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## Collaboration Patterns as a Function of Research Experience Among Mixed Researchers: A Mixed Methods Bibliometric Study

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### Abstract

Onwuegbuzie et al. (2018) documented that the degree of collaboration is higher for mixed researchers than for qualitative and quantitative researchers. The present investigation examined the (a) link between the research experience of lead authors and their propensity to collaborate (Quantitative Phase), and (b) role of research experience in collaborative mixed research studies (Qualitative Phase). Analyses of articles published in the *Journal of Mixed Methods Research* from 2007 (its inception) to the third issue in 2018 (time of data collection) revealed that the average research experience of lead authors decreased from 20.29 in 2007 to 14.24 in 2017 (last complete year), representing a significant reduction of 29.8%. No statistically significant relationship emerged between degree of collaboration and research experience. The qualitative phase yielded 3 themes and 9 subthemes that identified several differences and similarities between the desire for collaboration and research experience. In particular, for the least-experienced mixed methods researchers, collaboration might be associated with negative emotions (e.g., frustration, stress, anxiety) and this coupled with the lack of perceived weaknesses reported by the most-experienced sub-participants, suggest that years of experience have an impact on their affective state during the conduct of collaborative mixed methods research studies. Implications of these findings are discussed.

### Keywords

Mixed Methods Bibliometrics, Bibliometrics, Collaboration, Mixed Methods, Mixed Research

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# Collaboration Patterns as a Function of Research Experience Among Mixed Researchers: A Mixed Methods Bibliometric Study

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Collins, Onwuegbuzie, and Jiao (2006), who examined 14 major electronic databases (e.g., PsycINFO, CINAHL, ERIC) that represented the fields of psychology, education, sociology, social services, nursing and allied health, and business, determined that the first study in which the term *mixed methods* was used appeared in 1972 (Parkhurst, Lovell, Sprafka, & Hodgins, 1972). This finding indicates that the formal conduct of mixed methods research has been occurring for at least four decades. Interestingly, this landmark article involved multiple authors—specifically, four authors. Therefore, one question that comes to the fore is: To what extent does multiple authorship characterize the landscape of mixed methods research? Or alternatively stated, to what extent has collaboration occurred within the field of mixed methods research?

Until recently, this question has not been formally examined. Thus, Onwuegbuzie et al. (2018) chose to investigate this question. In particular, these researchers documented that the degree of collaboration is higher for mixed methods researchers than for qualitative and quantitative researchers. This finding has intuitive appeal because mixed methods research studies involve the mixing or combining of “quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004, p. 17) and thus potentially are more complex than are monomethod research studies (i.e., quantitative research studies alone, qualitative research studies alone). And such increased complexity likely would make it more challenging for a researcher to conduct a mixed methods research study alone because he or she must be competent in *both* qualitative research approaches and quantitative research approaches (Teddlie & Tashakkori, 2003).

Collaboration in mixed methods research studies (potentially) offers several advantages over conducting a research study alone, such as the following: (a) reducing the workload of the first author; (b) making the workload of each author (more) manageable; (c) increasing the overall level of expertise available for the study, thereby increasing *voluptuous legitimation*—also known as embodied validity or situated validity—which represents the extent to which the level of interpretation of the research team exceeds the knowledge base associated with the data (Lather, 1993); (d) increasing *investigation validity*, which represents the quality control of the research team (Kvale, 1995); and (e) increasing *communicative validity*, which includes the level of consensus among the research team members (Kvale, 1995). Consistent with this assertion, researchers have posited that collaboration in general (Bordons, Zulueta, Remero, & Barrigon, 1999; Katz & Martin, 1997; Lee & Bozeman, 2005), collaboration with other researchers from institutions external to their own institution (Zucker, Darby, & Armstrong, 2002), and collaboration with international peers (Abramo, D’Angelo, & Costa, 2008; Jarneving, 2010; Shin & Cummings, 2010; Smeby & Try, 2005) lead to increased research productivity, although the effect from collaboration differs according to collaboration partners, faculty disciplines, and collaboration partners’ geographical closeness (Abramo et al., 2008).

Yet, despite these potential advantages, collaboration among mixed methods researchers brings additional challenges for lead researchers, who have to maximize mutual respect, communication, collaboration, and coordination among all members of the research team—who might be diverse with respect to factors such as research orientation (e.g., quantitative research vs. qualitative research vs. mixed methods research), research training (e.g., applied researcher vs. methodologist), field (e.g., education, psychology, sociology), discipline (e.g., mathematics education, literacy education), academic rank (e.g., adjunct professor vs. instructor vs. assistant professor vs. associate professor vs. professor), and research experience. Thus, one would expect that the complexity of the underlying research topic in general and the research question(s) in particular, coupled with the complexity of the research design, would necessitate the formation of a more diverse team. In turn, the more diverse the team, likely the greater the challenge faced by the lead researcher/author to coordinate the research team and, subsequently, to maximize synergy. And as identified by Hall and Howard (2008), a synergistic approach maximally involves (a) mixing quantitative and qualitative research approaches that culminates in a mixed methods research study wherein both the research process and findings are superior than would have been obtained if an individual approach had been undertaken; (b) using a dialectic approach to research, wherein multiple research findings are intertwined; (c) considering of equal importance quantitative and qualitative research approaches; and (d) balancing opposing quantitative-qualitative viewpoints (e.g., using intersubjectivity to balance claims about subjectivity and objectivity; cf. Morgan, 2007). According to Hall and Howard (2008), implementing a synergistic approach to a mixed methods research study likely necessitates collaboration and cooperation among researchers—outcomes that are enhanced via strong leadership by the lead researcher/author.

On the one hand, it might be argued that the potential complexity in coordinating mixed methods research teams lends itself to lead researchers/authors with *more* research experience, who, compared to their less-experienced counterparts, likely have more confidence to lead research teams. Additionally, more-experienced researchers likely would have developed a larger network of colleagues (Lee & Bozeman, 2005) and, hence, a larger pool of potential collaborators from whom to draw. Related to this point, more-experienced researchers likely would have had more opportunities to collaborate in the past, which predicts reduced barriers associated with current collaborative research teams (Cummings & Kiesler, 2008). Also, because of their being more advanced in rank and levels of productivity, as well as their having secured relatively more scholarly leadership positions (e.g., journal editors, leaders [e.g., presidents, chairs] of professional associations) and activities (e.g., keynote addresses), their more demanding schedules (e.g., a heavier travel schedule to engage in professional activities) might be more likely to compel them to collaborate with colleagues in an attempt to reduce their workloads associated with their research and scholarship. In addition, because of their greater research experience, they might be more likely to serve as mentors for less-experienced colleagues (e.g., students, beginning researchers, emergent researchers) and, therefore, might be more likely to include their mentees as co-researchers/co-authors. Further, less-experienced researchers might feel pressure to publish solo articles for tenure and/or promotion purposes to demonstrate their ability to publish independently. Yet, on the other hand, one might argue that the potential complexity in coordinating mixed methods research teams necessitates a researcher who is *less* experienced—assuming a positive relationship between research experience and age—because they are more energetic (due to being younger in age) and, perhaps, even more naïve about her/his ability to lead a mixed methods research team. In addition, less-experienced researchers might be more inclined to ask colleagues to help them pursue their research agendas to make up for any areas of the mixed methods research process (e.g., mixed methods data analysis) in which they consider themselves as being weak. Also, more-experienced researchers might be more inclined to work alone because they have the experience and confidence to do so. At the same time, it might be that the relationship between research experience and propensity to collaborate within the mixed methods research community might vary as a function of demographic factors such as gender of the lead researcher/author and genre of the scholarship involved (e.g., empirical work vs. methodological/conceptual/theoretical work). Indeed, with respect to the former variable, Wilcox et al. (2015), who conducted a mixed methods research study, in the quantitative phase, documented that women (57.7%) were statistically significantly ( $p < .05$ ) more likely than were men (42.3%) to be lead authors of mixed methods research articles. However, the qualitative phase revealed that women were much more likely to report the (potential) negative aspects of collaboration, less likely to express positive emotions, less likely to refer to collaborative experiences that contributed to their professional development, and less likely to discuss their perceived strengths associated with leading mixed methods research teams—although they were more likely than were men to discuss motivation and more likely to discuss the importance of coursework in preparation for collaborating with others researchers. With respect to the latter variable (i.e., genre of the scholarship), Zawacki-Richter and Von Prummer (2010) stated that the type of research reflects the degree of collaboration.

To date, surprisingly, only a few researchers have examined the relationship between research experience and propensity to collaborate. Most notably, van Rijnsoever and Hessels (2011) reported that years of research experience were positively related to both disciplinary research collaboration and interdisciplinary research collaboration. Consistent with this finding is the result that assistant professors tended to have a lower probability of co-authorship (Piette & Ross, 1992) because assistant professors often work alone in order to build their reputation (i.e., *brand name*; McDowell & Melvin, 1983). Even more surprisingly, we could not find a

single study in which collaboration rates among mixed methods researchers were compared as a function of research experience. This was the first purpose of this mixed methods research study (Quantitative phase). The second purpose was to compare experiences conducting mixed research in teams between more-experienced and less-experienced researchers (Qualitative phase). The following research questions were addressed in this study:

1. What are the collaboration rates among mixed methods researchers as a function of research experience?
2. What are the differences, if any, in experiences conducting mixed methods research between more-experienced and less-experienced researchers?

This article involved the collaboration of the following co-authors: Anthony J. (Tony) Onwuegbuzie and Melanie S. Wachsmann (lead author), Susan Hoisington, Vanessa Gonzales, Rachael Wilcox, Rachel Valle, and Majed Aleisa, who were all doctoral students at Sam Houston State University during the data collection phase of the study. During this data collection phase, Tony Onwuegbuzie was a Professor in the Department of Educational Leadership at Sam Houston State University, where he taught doctoral-level courses in qualitative research, quantitative research, and mixed methods research, including program evaluation. Currently, he is a professor and senior research associate at the University of Cambridge. Further, he is a Distinguished Visiting Professor at the University of Johannesburg; an Honorary Professor at the University of South Africa; a Honorary Visiting Scholar at Flinders University, College of Nursing and Health Sciences; a Visiting Senior Scholar at St. John's University, New York; a Certified Ed.D. Thesis supervisor for Laureate online Education, University of Liverpool Partnership; and an Honorary Recognised Supervisor (Online), School of Histories, Languages and Cultures, University of Liverpool. Over the last 15 years, he has delivered more than 200 mixed methods research workshops that include instruction in qualitative research and quantitative research, across six continents, including more than a dozen workshops at the American Educational Research Association (AERA) conference. From the moment that he started teaching mixed methods research courses in 1998 at Valdosta State University, he (who had earned a methodological Ph.D., and had been trained to teach both qualitative and quantitative research courses) has been extremely passionate about mixed methods research, resulting in him serving as President of the Mixed Methods International Research Association (MMIRA; [www.mmira.org](http://www.mmira.org)). He decided to design his mixed methods research courses, under this ethos that, once fully developed, he would make his pedagogy public by co-authoring with other instructors of mixed methods research courses—namely, Professor Rebecca Weinbaum (Lamar University), Professor Nancy L. Leech (University of Denver, Colorado) and Professor Kathleen M. T. Collins (University of Arkansas at Fayetteville)—an article that provided a detailed summary as to how he and his colleagues taught their mixed methods research courses (Onwuegbuzie, Frels, Leech, & Collins, 2013). In this article, which was published in the *International Journal of Multiple Research Approaches*, the authors discuss the four major phases of the mixed methods research course, as follows: (a) *Conceptual/Theoretical Phase* (i.e., wherein the instructors present an overview of the mixed methods research process); (b) *Technical Phase* (i.e., wherein the instructors describe numerous qualitative data analysis approaches [cf. Leech & Onwuegbuzie, 2007, 2008, 2011; Onwuegbuzie & Denham, 2014], numerous quantitative data analysis approaches [cf. Onwuegbuzie & Daniel, 2003], and several mixed analysis approaches [cf. Onwuegbuzie, Slate, Leech, & Collins, 2007, 2009] from different traditions and different epistemologies, delineating when to use each type of analysis and how to conduct each of these analyses using computer-assisted qualitative data analysis software [CAQDAS] and statistical software); (c) *Applied Phase* (i.e., wherein the instructors teach students how to collect, to

analyze, and to interpret both qualitative data and quantitative data, and how to write up mixed methods research reports via a series of what the instructors call *mixed methods notebooks*, wherein students use computer-assisted mixed methods data analysis software [e.g., QDA Miner, WordStat] to facilitate the mixed methods analysis of data that they had collected during the course using several mixed methods analytic approaches); and (d) *Emergent Scholar Phase* (i.e., wherein after the course ends, students are expected to present their mixed methods research studies at professional meetings and, hopefully, to author/co-author manuscripts that are submitted to journals to be reviewed for possible publication [as all the other authors of this article had accomplished]); also, students who have previously taken this course are encouraged to team-teach future mixed methods research courses with their instructors/professors.

In 2013, Tony and his former doctoral student, Professor Rebecca Weinbaum (Lamar University), introduced a research philosophy that they referred to as critical dialectical pluralism (Onwuegbuzie & Frels, 2013). According to this research philosophy, researchers conduct studies that are culturally progressive, that advance and sustain egalitarian societies, and that promote both universalistic theoretical knowledge and local practical knowledge. In particular, critical dialectical pluralist researchers avoid conducting research that promotes any kind of cultural deficit model. Instead, they incorporate the social and cultural capital that prevails among marginalized, under-served, and oppressed individuals and groups, such as their resiliency, often yielding resiliency-based research. As noted by Tony and Rebecca:

At its most basic level, critical dialectical pluralism takes a pluralist ontological stance (hence the word pluralism), and operates under the assumption that there are multiple important kinds of reality that include subjective, objective, and intersubjective realities. Critical dialectical pluralism relies on the dialectical, dialogical, and hermeneutical approach to understanding phenomena (hence the word dialectical). (Onwuegbuzie & Frels, 2013, p. 16) [emphasis in original]

As can be seen from this statement, the critical dialectical pluralist stance aligns itself extremely well with the concept of students co-authoring and even leading research projects with their instructors/professors/mentors/advisors/supervisors. Enter Melanie S. Wachsmann, Susan Hoisington, Vanessa Gonzales, Rachael Wilcox, Rachel Valle, and Majed Aleisa, the co-authors of the current article and doctoral candidates in either the Higher Education Leadership Program (i.e., Melanie, Susan, Vanessa, Rachael, and Rachel) or the Literacy Program (i.e., Majed) at Sam Houston State University at the inception of the research study.

In the Spring 2015 semester, Melanie, Susan, Vanessa, Rachael, Rachel, and Majed were enrolled in Tony's mixed methods research course. During this course, they expressed interest in collaborating in a series of mixed methods research studies about collaboration among mixed methods researchers. And after co-presenting a paper on their preliminary findings at the MMIRA Regional Conference in Jamaica in March 2015—that occurred mid-way during the mixed methods research course—that was extremely well received, we decided to increase the audience for our findings by publishing our paper in a respected, high-quality qualitative research journal—as we have been extremely fortunate to have accomplished in having the current article published in *The Qualitative Report*. During the research process, as noted previously, Tony began working full-time for the University of Cambridge (and became affiliated with several other universities), and Susan and Rachael (for whom Tony served as her dissertation chair) earned their doctorate degrees. Currently, he is editor-in-chief of the *International Journal of Multiple Research Approaches* and co-editor of *Research in the Schools*.

## Method

### Mixed Methods Bibliometric Study

The present study involved the conduct of what Onwuegbuzie et al. (2018) conceptualized as a *mixed methods bibliometric study*. Specifically, in mixed methods bibliometric studies, qualitative data are mixed or combined with bibliometric quantitative data for the purpose of helping researchers identify the patterns of publications within a given field, discipline, or body of knowledge (i.e., Quantitative phase[s]), as well as understand how these patterns have emerged (i.e., Qualitative phase[s]), in order to determine the degree of development of various fields/disciplines/knowledge areas.

### Sampling Design and Sample

A quantitative sample and a qualitative sample were involved in this mixed methods bibliometric study that yielded largely what Onwuegbuzie and Collins (2007) termed as a concurrent design using nested samples wherein the qualitative sample was a subset of the quantitative sample: (a) the quantitative data and qualitative data were independently collected and (b) 80% of the participants interviewed in the qualitative phase of this study had authored/co-authored one or more of the articles that were published in the journal that was examined in the quantitative research phase.

With regard to the quantitative research phase of this study, a criterion sampling scheme was used that involved the selection of the flagship mixed methods research journal, namely, *Journal of Mixed Methods Research (JMMR)*. All articles published from 2007 (*JMMR*'s inception) and the third issue in 2018—the current issue at the time of the research study—were investigated in order to enhance the generalizability of the quantitative phase of this mixed methods bibliometric study.

For the qualitative phase, participants were selected via a purposive sampling scheme, specifically, a maximum variation sampling scheme (Miles & Huberman, 1994). The sample for this qualitative phase, which included two of the researchers of this study, consisted of 14 mixed methods researchers representing institutions from various regions of the United States. As noted by Johnson and Christensen (2010), “when greater resources are available, collective case studies of around 10 cases are common” (p. 397). Moreover, Guest, Bunce, and Johnson (2006) demonstrated that 12 interviews are sufficient to “understand common perceptions and experiences among a group of relatively homogeneous individuals” (p. 79)—thereby suggesting that our sample size of 14 was adequate for obtaining *data saturation* (i.e., occurring when information occurs so repeatedly that researchers can expect it and whereby the collection of more data appears to yield no value added interpretations; Sandelowski, 2008; Saumure & Given, 2008) and *theoretical saturation* (i.e., occurring when the analyst can assume that her/his emergent theory is sufficiently developed to be consistent with any future data collected; Sandelowski, 2008). Two of the participants served as complete member participants (Adler & Adler, 1987) because they were both researchers and participants in this mixed methods bibliometric study.

With regard to the quantitative phase of this mixed methods research study, five of the co-researchers participated in the quantitative data collection phase, with two of them documenting the number of authors involved in each mixed methods research article and three of them determining the research experience of each author across all the articles. All five co-researchers participated in the quantitative analysis and interpretation stage. With respect to the qualitative phase, four of the co-researchers conducted all the interviews among them and transcribed them. With respect to the qualitative data analysis, whereas three of the co-



researchers analyzed the interview transcripts, all five co-researchers participated in the data interpretation stage and thus played a significant role in the emergent meta-inferences (i.e., involving inferences stemming from both the qualitative and quantitative findings being combined into a coherent whole; Tashakkori & Teddlie, 1998). The two complete member participants (i.e., participant-researchers) did not participate in the analysis and interpretation of the qualitative data in order to facilitate epoché because it was deemed by members of the research team that it would be difficult for them “to mitigate the potential deleterious effects of unacknowledged preconceptions related to the research and thereby to increase the rigor of the project” (Tufford & Newman, 2010, p. 81).

The 14 participants comprised six women and eight men, whose academic ranks ranged from adjunct professor to assistant professor to full professor. Based on the Carnegie Classification (The Carnegie Foundation for the Advancement of Teaching, n.d.), each participant was affiliated with one of the following types of institutions: (a) institutions with very high research, (b) institutions with high research, (c) institutions with doctoral-level research, and (d) institutions wherein research is not classified. The research experience of these participants ranged from 3 years to 43 years ( $M = 16.86$ ,  $SD = 11.43$ ).

**Mixed research design.** The research design underlying our mixed methods bibliometric study was what Mayoh and Onwuegbuzie (2014, 2015) labeled as a *mixed methods phenomenological research* (MMPR) study. This MMPR design involved combining postpositivism (i.e., quantitative phase) and phenomenology (i.e., qualitative phase)—which was characterized by a dominant descriptive phenomenological phase and a less-dominant postpositivist phase (i.e., PHEN+quan; Mayoh & Onwuegbuzie, 2014, 2015). In particular, in the qualitative phase of our study, we were interested in obtaining accounts of each researcher’s individual lived experiences or *life-world* (Todres & Holloway, 2004) via a descriptive phenomenology. According to Giorgi (2009) descriptive phenomenological research studies incorporate the following four fundamental principles: (a) intentionality; (b) research’s primary use is to describe; (c) application of phenomenological reduction (i.e., the researcher ignores prior knowledge and is perceptive when analyzing phenomenological data; a strong focus on subjectivity, rather than on consciousness, is exercised by the researcher); and (d) “the *essence* or *bare bones* of what constitutes the phenomenon is articulated as the structure”—thereby yielding a depiction of “the common themes or essential parts from within the experience that identify the phenomenon and transcends the experiences of different individuals” (Mayoh & Onwuegbuzie, 2015, p. 95). The goal of descriptive phenomenologists is to make a conscious effort to minimize the role of the researcher on the data, through a technique known as bracketing (i.e., epoché; Husserl, 1931), which involves suspending judgment pertaining to past knowledge in an attempt to focus on the analysis of experience (Giorgi, 2009).

As stated earlier, two of the participants were part of this study’s research team. As a result, phenomenological reduction was augmented because these research-participants had the opportunity to keep other members of the research team *honest* by promoting reflexivity at various steps of the mixed methods bibliometric study. Additionally, a postpositivist perspective was used (a) to identify the relationship between the degree of collaboration among mixed methods researchers and the researchers’ experiences and (b) to quantize (i.e., transforming qualitative data into numerical codes that subsequently can be analyzed quantitatively or statistically; Miles & Huberman, 1994; Onwuegbuzie & Teddlie, 2003; Sandelowski, Voils, & Knafl, 2009; Tashakkori & Teddlie, 1998) all evolving themes. Figure 1 displays the philosophical assumptions and stances underlying our mixed methods bibliometric study.

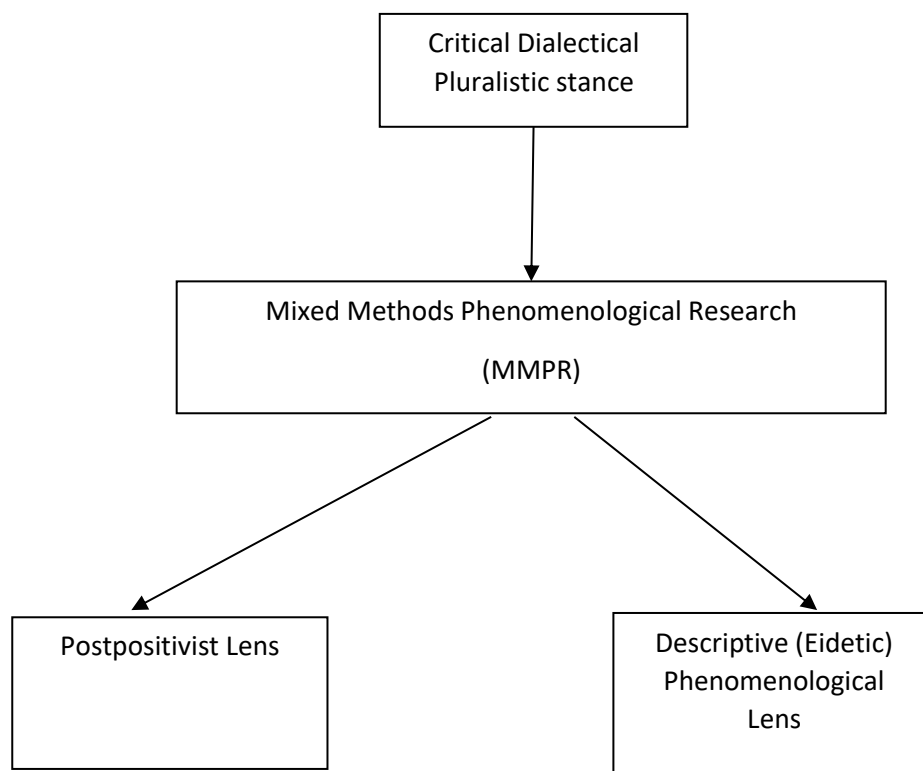


Figure 1. Philosophical assumptions and stances underlying the study.

### Mixed Data Collection

**Instruments and procedure.** For the quantitative phase, the researchers determined the number of authors contained in each article published in *JMMR* during the period of examination (i.e., from its inception in 2007 to the current issue at the time of writing in 2018). Once we had determined this number, we computed a measure of collaborative research patterns using an index called the *degree of collaboration*, which can be calculated via the following formula provided by Subramanyam (1983):

$$CC = NM / (NM + NS)$$

where CC represents the degree of collaboration, NM represents number of multiple-authored articles, and NS represents the number of single-authored articles. In other words, the degree of collaboration is the ratio of number of multi-authored journal articles to the total number of journal articles (i.e., # of single-authored articles + # of multiple-authored articles) (Subramanyam, 1983). Further, for each author—both within and across the complete set of articles—we determined the number of years that had elapsed since graduation. This post-doctorate number of years served as a proxy measure of research experience. Also, we noted several demographic characteristics of each article (e.g., gender of lead author, genre of manuscript [i.e., empirical articles vs. methodological/conceptual/theoretical articles]).

After Institutional Review Board approval had been obtained for the qualitative phase from the institution belonging to the researchers, we followed ethical procedures during the interviews. Specifically, we informed all interviewees beforehand that member checking techniques would be used to ensure that our descriptions would provide an accurate and adequate representation of their accounts (Manning, 1997). Also, we maintained confidentiality via our use of participant-selected pseudonyms.

Each participant undertook a semi-structured interview that comprised 13 open-ended questions. The questions included the following: (a) "In your experience, what have you found to be the pros and cons of (i) conducting mixed methods research studies alone and (ii) conducting mixed methods research studies with one or more co-researchers?"; (b) "In your experience, what have you found to be the pros and cons of (i) writing mixed methods research articles (e.g., empirical, methodological, conceptual, theoretical) alone and (ii) writing mixed methods research articles (e.g., empirical, methodological, conceptual, theoretical) with one or more co-authors?"; (c) "What advice do you have, if any, for beginning and emerging researchers who are conducting their first mixed methods research study and are considering collaborating with one or more co-researchers?"; and (d) "What advice do you have, if any, for beginning and emerging researchers who are writing their first mixed methods research article (e.g., empirical, methodological, conceptual, theoretical) and are considering collaborating with one or more co-authors?"

In addition, we posed follow-up questions to the participants based on their responses in an attempt to obtain thicker and richer data (Geertz, 1973). These interviews, which were audio-recorded using a minimum of two hand-held digital recorders to ensure stability and clarity of the interview data, were completed in person or virtually (i.e., via Skype). Each interview then was transcribed carefully and electronically delivered via email to the participants to guarantee that accuracy, adequacy, and authenticity of the data via member checking (Lincoln & Guba, 1985), thereby maximizing the descriptive validity of the findings (Maxwell, 1992).

As recommended by Onwuegbuzie, Leech, and Collins (2008), each interviewer underwent what they conceptualized as a debriefing interview in order to promote reflexivity; to obtain insights into the impact of the interview process on the participants and the researchers themselves; and to identify biases in interpreting the interview data (see also Collins, Onwuegbuzie, Johnson, & Frels, 2013; Frels & Onwuegbuzie, 2012). These debriefing data yielded additional data that helped to frame the interpretations of the interview data and to enhance transparency (Collins et al., 2013).

## Analysis

**Quantitative analyses.** The quantitative phase involved the use of both descriptive analyses and inferential analyses. Specifically, the descriptive analyses involved the use of descriptive statistics to assess both the degree of collaboration and the post-doctoral number of years that comprised a measure of central tendency (i.e., frequency counts) and measures of distributional shape (i.e., skewness, kurtosis). With regard to inferential analyses, Pearson  $r$  was used to determine the relationship between the degree of collaboration and research experience across the years (i.e., 2007-2015) and for each year. For the within-year tests, the Bonferroni adjustment was applied to prevent the total experiment-wise error rate from exceeding 5% (e.g., Chandler, 1995; Ho, 2006; Manly, 2004; Vogt, 2005). This correction was undertaken by dividing the nominal alpha value (i.e., .05) by the number of inferential tests (i.e., number of volume years) involved.

**Qualitative analyses.** Using the process outlined by Giorgi (2012), we underwent following five steps: (a) The researchers on the team (i.e., analysts) who were responsible for the qualitative data analysis first read the whole set of transcripts in order to obtain a holistic sense of the participants' experiences; (b) the analysts then re-read and coded each individual transcript to yield meaning units, which represent the "process of constituting parts" (p. 5); (c) in what Giorgi (2012) referred to as the "the heart of the method" (p. 6), the analysts then transformed each set of codes into expressions that were more directly revelatory of the psychological importance of the participant's voice with regard to the phenomenon of collaboration being studied; (d) the analysts then reviewed the direct and psychologically more sensitive expressions, and via "free imaginative variation" (p. 6), an essential structure of each experience was documented; and, finally, (e) the analysts used the essential structure as a means to clarify and to interpret the raw data inherent in each transcript.

For the purpose of coding, the analysts conducted a constant comparison analysis using QDA Miner, Version 4.1.12 (Provalis Research, 2014), which is a software program intended for both qualitative data analysis and mixed methods data analysis. QDA Miner can be used to code, to annotate, to retrieve, and to analyze both images and a variety of text-based file formats (Provalis Research, 2014).

The overall goal of constant comparison analysis is to identify themes from the participants' responses (Glaser, 1965). There are three steps to this analysis: (a) open coding, (b) axial coding, and (c) selective coding. Open coding is the process by which raw data are organized into meaningful groups that then are labeled (Glaser & Strauss, 1967). Axial coding, the next step, involves grouping these labels (i.e., codes) into similar categories, after which they are pooled and refined during the selective coding stage to frame these codes within an informative narrative (i.e., social phenomenon; Glaser & Strauss, 1967).

**Mixed analyses.** Overall, both a concurrent mixed analysis and sequential mixed analysis (Onwuegbuzie & Combs, 2010; Onwuegbuzie & Teddlie, 2003) were utilized. With regard to the concurrent mixed analysis, the analysis of the (quantitative) bibliometric data took place independently of the analysis of the (qualitative) interview data. However, the analysis of the interview data involved the use of a sequential mixed analysis. Specifically, the emergent themes were transformed into data that could be analyzed descriptively (i.e., quantitized; Miles & Huberman, 1994; Onwuegbuzie & Teddlie, 2003; Sandelowski et al., 2009; Tashakkori & Teddlie, 1998).

Onwuegbuzie and Teddlie (2003) identified the following seven stages of the mixed methods analysis process: (a) data reduction, (b) data display, (c) data transformation, (d) data correlation, (e) data consolidation, (f) data comparison, and (g) data integration. In our mixed methods bibliometric study, we used six of Onwuegbuzie and Teddlie's (2003) seven stages: data reduction, data display, data transformation, data correlation, data comparison, and data integration. In particular, we extracted themes and meta-themes from the interview data (i.e., data reduction). Further, we displayed visually qualitative and quantitative data (i.e., data display), as well as correlated quantitative data (i.e., research experience data) with qualitative data (i.e., themes) (i.e., data correlation). Additionally, we compared quantitative data (i.e., bibliometric data) to qualitative data (i.e., interview data). Also, we integrated the quantitative and qualitative findings (i.e., data integration).

## Results

**Quantitative phase.** An analysis of the 223 articles published in *JMMR* from 2007 (its inception) to 2018 (Issue 3) revealed that the number of authors per manuscript ranged from 1 to 13 ( $M = 2.84$ ,  $SD = 1.98$ ). Interestingly, 69.5% of the articles involved more than one

author—which yielded the degree of collaboration. Further, 30.5% of articles involved one author, 22.4% involved two authors, 19.7% involved three authors, 9.0% involved four authors, 8.5% involved five authors, 4.5% involved six authors, 2.7% involved seven authors, 1.3% involved eight authors, 0.9% involved 10 authors, and 0.4% involved 13 authors.

Using Onwuegbuzie and Daniel's (2002) criteria for a standardized skewness coefficient (i.e., skewness coefficient divided by its standard error) and a standardized kurtosis coefficient (i.e., kurtosis coefficient divided by its standard error), wherein standardized skewness coefficients and standardized kurtosis coefficients that lie outside the  $\pm 3$  range indicate serious departures from normality, although the kurtosis coefficient pertaining to research experience (i.e., 1.60) was within the range of normality, the skewness coefficient (6.90) was far outside the range of normality, indicating positive skew. Overall, the research experience of the lead author ranged from 0 to 49 years ( $M = 13.67$ ,  $SD = 11.27$ ). It should be noted that a research experience of 0 years was designated either to an author who had not yet graduated or who was in her/his first year post-doctorate. Interestingly, exactly one half (50.0%) of the lead authors had 10 or more years of research experience, 33.8% had 15 or more years of research experience, 25.2% had 20 or more years of research experience, 17.6% had 25 or more years of research experience, 12.9% had 30 or more years of research experience, and 6.7% had 35 or more years of research experience.

Table 1 presents the mean and standard deviation pertaining to research achievement of the lead author as a function of publication year. A test of orthogonal polynomials (i.e., one-way analysis of variance [ANOVA]) for the total 223 articles did not reveal a linear trend ( $F[1, 198] = 1.24$ ,  $p = .27$ ), quadratic trend ( $F[1, 198] = 3.52$ ,  $p = .06$ ), cubic trend ( $F[1, 198] = 0.01$ ,  $p = .93$ ), or quartic trend ( $F[1, 198] = 0.16$ ,  $p = .70$ ) in research experience. However, when the research achievement of the lead author were disaggregated by genre of article (i.e., empirical vs. non-empirical), some trends emerged. Specifically, for lead authors of single-authored articles, a statistically significant quadratic trend emerged ( $F[1, 50] = 4.89$ ,  $p = .03$ ), with a moderate effect size ( $\omega^2 = .08$ ). Most notably, after the research experience of the lead author peaked in the year of inception (2007), it continued to drop until it reached a low level in 2010, thereafter increasing but oscillating in subsequent years (see Figure 2). With respect to lead authors of multiple-authored articles, a statistically significant quintic trend emerged ( $F[1, 136] = 444.02$ ,  $p = .049$ ), with a small effect size ( $\omega^2 = .03$ ). Most notably, after the research experience of the lead author peaked in 2009, it continued to drop until it reached a low level in 2015, thereafter increasing in subsequent years (see Figure 3). The non-normality of research experience might call into question these trends; however, it should be noted that  $F$  tests generally are robust to non-normality inasmuch as when data are non-normal, the actual Type I error rate typically is adequately close to the nominal value (Maxwell & Delaney, 2003).

Table 1. Mean and Standard Deviation of Research Experience of Lead Authors by Year

Year	<i>M</i>	<i>SD</i>
2007	20.29	10.87
2008	11.13	12.31
2009	18.33	12.39
2010	11.87	7.81
2011	11.87	7.58
2012	16.14	13.65
2013	14.67	12.28
2014	10.48	7.05
2015	8.41	11.13
2016	12.37	11.82

2017	14.24	11.96
2018	15.71	11.56
Total	13.67	11.27

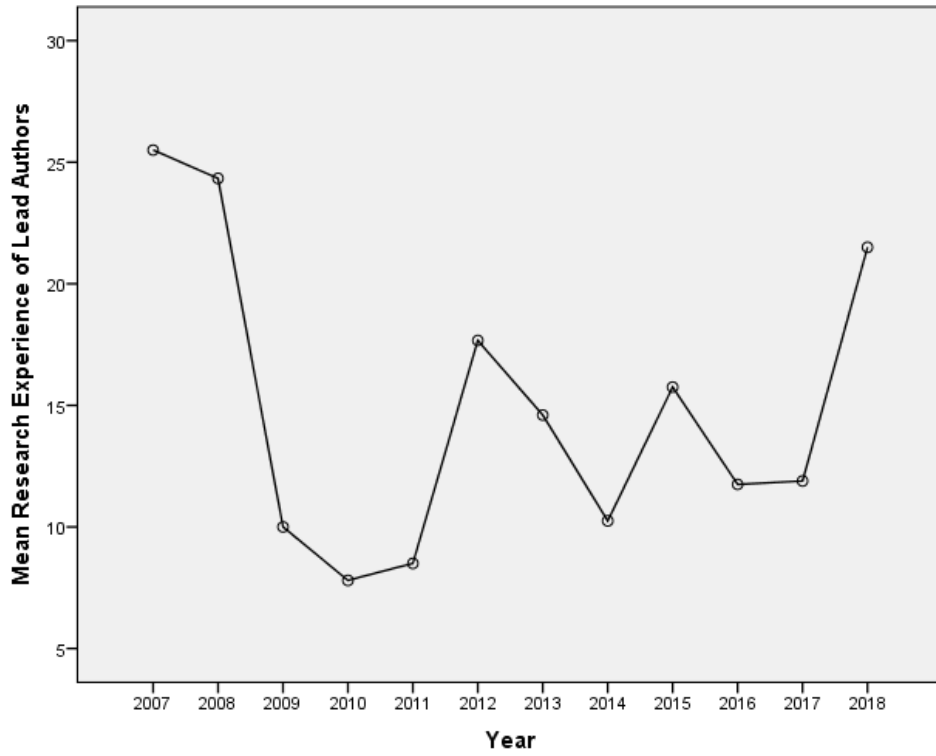


Figure 2. Research experience of lead authors of single-authored articles by publication year.

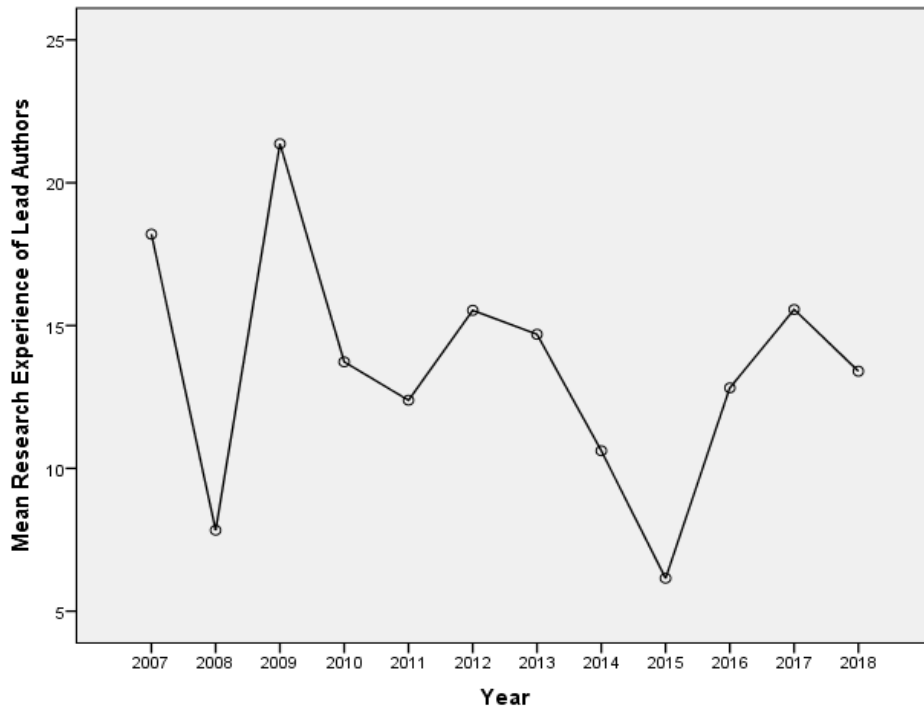


Figure 3. Research experience of lead authors of multiple-authored articles by publication year.

Because of this departure from normality, a nonparametric  $t$  test was used—specifically, Mann-Whitney’s  $U$  test—to compare the research experience of lead authors who represented single authors to those who had one or more co-authors. The Mann-Whitney  $U$  test revealed a statistically non-significant difference in research experience ( $U = 4510.00$ ,  $p = .85$ ) between authors who represented single authors ( $M = 14.23$ ,  $SD = 12.14$ ) and those who had one or more co-authors ( $M = 13.44$ ,  $SD = 10.92$ ). Table 2 presents the mean and standard deviation pertaining to research achievement as a function of type of collaboration and publication year. It can be seen from this table that, after applying the Bonferroni adjustment, no statistically significant difference emerged between the two types of lead authors.

Table 2. Mean and Standard Deviation of Research Experience of Lead Authors as a Function of Type of Collaboration and Year

Year	Single-Authored		Multiple-Authored		Mann-Whitney’s $U^*$
	$M$	$SD$	$M$	$SD$	
2007	25.50	14.80	18.20	8.99	14.00
2008	24.33	18.91	7.83	8.28	7.50
2009	10.00	1.41	21.36	13.28	12.00
2010	7.80	2.17	13.73	8.81	12.50
2011	8.50	2.12	12.38	8.03	10.00
2012	17.67	18.04	15.53	12.19	43.50
2013	14.60	10.31	14.69	13.35	27.50
2014	10.25	6.34	10.62	7.70	52.00
2015	15.75	19.00	6.15	7.18	14.50
2016	11.75	10.93	12.82	12.94	43.00
2017	11.89	10.04	15.56	13.03	54.50
2018	21.50	16.82	13.03	8.82	14.00
Total	14.23	12.14	13.44	10.92	4510.00

\* None of the Mann-Whitney  $U$  statistics were statistically significant at the Bonferroni-adjusted level of .005 (i.e., .05 / 10 comparisons).

No statistically significant difference emerged in research experience between the two types of lead authors as a function of gender of the lead author. Specifically, for women lead authors, no statistically significant difference was present in research experience ( $U = 1200.50$ ,  $p = .84$ ) between authors who represented single authors ( $M = 12.48$ ,  $SD = 10.61$ ) and those who had one or more co-authors ( $M = 12.94$ ,  $SD = 10.66$ ). Similarly, for men lead authors, no statistically significant difference emerged in research experience ( $U = 643.00$ ,  $p = .39$ ) between authors who represented single authors ( $M = 17.00$ ,  $SD = 13.87$ ) and those who had one or more co-authors ( $M = 14.10$ ,  $SD = 11.78$ ).

Finally, no statistically significant difference was obtained in research experience between the two types of lead authors as a function of the genre of article. Specifically, for empirical research articles, no statistically significant difference was present in research experience ( $U = 1320.00$ ,  $p = .54$ ) between authors who represented single authors ( $M = 9.61$ ,  $SD = 8.43$ ) and those who had one or more co-authors ( $M = 10.91$ ,  $SD = 9.36$ ). Similarly, for methodological/conceptual/theoretical articles, no statistically significant difference emerged in research experience ( $U = 722.50$ ,  $p = .56$ ) between authors who represented single authors ( $M = 18.03$ ,  $SD = 13.46$ ) and those who had one or more co-authors ( $M = 19.04$ ,  $SD = 12.11$ ).

**Qualitative phase.** In order to investigate the link between research experience and propensity to collaborate, the qualitative phase of this study focused on examining the

experiences of a subset of six mixed methods researchers from the 14 participants: three participants with the most years of experience—ranging from 32 years to 45 years ( $M = 38.00$ ,  $SD = 6.56$ ), and three participants with the fewest years of experience, ranging from 1 year to 6 years ( $M = 3.67$ ,  $SD = 2.52$ ). Participants were selected from the highest- and lowest-ends of the research experience continuum in order to maximize our ability to identify differences between these two sets of sub-participants.

A constant comparison analysis (Glaser, 1965) was used to identify descriptive codes that were common within the interview transcripts of these six mixed methods researchers (Saldaña, 2013), and then the codes were placed into categorized themes (Strauss & Corbin, 1998). The constant comparison analysis revealed nine descriptive codes or subthemes that yielded the following three themes: (a) negative emotion, (b) mental, and (c) research. The themes and subthemes are shown in Table 3. Each of these themes and subthemes is discussed in the following sections.

Table 3. *Themes and Subthemes Identified Through Constant Comparison Analysis*

Themes	Codes
Negative Emotions	Frustration Stress and Anxiety
Mental	Difficulty Perceived Weaknesses Lack of Confidence
Research	Independent Research Group Research Experiences Group Research Preferences Motivation to Collaborate

**Negative emotions.** The findings from the first theme, *negative emotions*, revealed that least-experienced researchers expressed negative emotions more than did the most-experienced researchers. More specifically, the least-experienced researchers described emotions relating to frustration, stress, and anxiety. Contrastingly, none of the most-experienced researchers expressed any negative emotions.

Least-experienced researcher, Kate Vining (this and all other names are pseudonyms), replied that, “You can save yourself a little bit. Save yourself a lot of heartache, that’s for sure,” in reference to setting norms for collaboration, and that a previous failure to do so, caused frustration. Further, she indicated two times within the interview that she felt stress and anxiety when working on a mixed methods research study. The first instance was a general statement about creating and conducting the study, and the second instance was about missing something in the process of coding the qualitative data, because she believed that she was stronger in quantitative research methodology. Similarly, when Hanna Hayes (a least-experienced researcher) was asked to clarify what part of mixed methods that induced anxiety about the process or the theory, she replied, “Everything. All of it.”

**Mental.** The theme, *mental*, comprised three subthemes: (a) difficulty, (b) perceived weaknesses, and (c) lack of confidence. As was the case in the previous theme, this theme distinguished the two groups of researchers (i.e., least- and most-experienced). Specifically, only the three researchers with the fewest years of experience made statements which indicated



that they had struggled with most of the identified subthemes, whereas the three most-experienced researchers did not indicate such a struggle.

In particular, all of the least-experienced researchers encountered difficulty when working alone on a mixed methods research study. Both Hanna Hayes and Lawrence Dobbs referred to writing independently as a struggle. Kate Vining had difficulty with data collection in her solo mixed methods research study. The participant who noted difficulty most often was Hanna Hayes. She mentioned the complexity of mixed methods models and discomfort with finding significance levels on the quantitative side and coding on the qualitative side. In addition, she stated that, "I lack so much confidence quantizing qualitative data and I didn't want to pick up the phone and call my mentor because I really wanted to do this research solo."

When evaluating the perceived weaknesses of the least-experienced researchers, we discovered that these feelings are present among researchers working independently and in researchers working in collaboration with others. Kate Vining shared that, "When you're working with a co-author, what I have found is that I'm almost stunned in action or fear of me jumping in and putting something in there that would be of less quality than they have." However, Hanna Hayes described her perceived weaknesses while working independently, "I struggle with knowing what's been done and if I'm writing a conceptual piece, or coming up with a new idea, making sure that I don't replicate it (what's really been done)."

Lack of confidence was the third subtheme within the mental theme analysis and was described by two of the three least-experienced researchers. Both Hannah Hayes and Kate Vining made several references about self-doubt in their interviews. Kate's lack of self-confidence manifested itself in collaboration with others, no matter their years of experience. She claimed,

The last thing that you want is to be working with someone who's just as doubtful about their ability in that area as you are because, like I said, you're both just looking at each other like, "Who's going to start? I don't want to do that part. Who's going to do that part?"

Conversely, Kate also felt a lack of confidence when collaborating with well-published researchers: "The number of published articles that they have is just astronomical, and so there's that self-doubt."

Hannah's self-doubt revealed itself in the context of mixed methods research. She stated that, "I struggled with confidence. Confidence that these ideas (mixed methods related) were actually warranted, justified, or...conceptualized correctly. I struggled with it," and that, "I don't have the confidence to put myself out there as a methodologist."

**Research.** The final theme revealed by the analysis was *research*. Within this theme there were four subthemes: (a) independent research, (b) group research experiences, (c) group research preferences, and (d) motivation to collaborate. Although the previous themes showed a disparity between the two groups of researchers, this theme mainly illustrated similarities.

When asked about independent research, all of the least-experienced researchers gave a negative response to working alone, which suggested their preference for working in collaboration. Lawrence Dobbs concluded, "I think writing independently is really difficult [laughs], I think it's a challenge," and Hanna Hayes admitted, "Solo, I'm not confident enough." Hanna Hayes referred two more times to a lack of confidence when working independently. However, the most-experienced researchers also had negative reactions to working independently but for different reasons. Jack Banks remarked that "if I open my closet here, I have about 10 different manuscripts that I never published; and I look at them and almost all of them are single author." Another perspective was given by George Maguire who shared that,

“when I do things independently, it's not as much fun and...writing to me is a social event.” Nevertheless, Greg Wilson did prefer to work independently for methodological writing, stating that “I have my own ideas of things.”

When questioned about working in collaboration, all six of the sub-participants answered that they did prefer to work with others. Each sub-participant shared their group research experiences, both positive and negative. Among the negative experience responses, all six researchers mentioned a situation where the group dynamic suffered because of a member who did not contribute. Lawrence Dobbs spoke about one negative situation that he experienced:

I can think of one project and it was an international project, I was not that familiar with the individuals, we didn't know each other that well. And ah, you know, that particular issue arose for someone, you know, wasn't following through on their tasks. So, I think it might have been an issue of that we weren't familiar with each other. It was difficult to assess how motivated this person would be to continue and so I haven't collaborated with this person since, obviously.

Similarly, Hanna Hayes learned through her collaboration experiences that she preferred to work with a maximum of two other people and that after three people, the others simply serve as editors.

Two of the most-experienced researchers mentioned that when working with students or early researchers, they write a physical contract with the expectations to ensure true collaboration. Jack Banks shared an experience that illustrated the need for a contract:

Just for example, I had students who did projects with me. And I'm looking at proceedings or I'm looking at a reference, or the proceedings database, and ... find out that the student had gone somewhere and presented a paper on research that we had been working on. I didn't have a clue, that the student was going to present in a place and put...you know, her name on it.

These aforementioned research experiences had shaped the sub-participants' preferences for working with others.

According to the interview data, there were two main reasons that the participants are motivated to collaborate with other researchers. One reason mentioned by all three of the least-experienced researchers is that working in teams keeps the research study moving along. Hanna Hayes stated:

I have one co-author at another university and she graduated with me and we work really well...we work really well together, because she will set a deadline and hold to it. She depends on me for the research methodology and she defers a lot to me; but, really, she keeps the project going.

A second reason given by two thirds of the sub-participants—evenly split between the two groups of researchers—was that working in collaboration with others provides the opportunity to learn from others and to gain different perspectives. George Maguire stated, “I have not had an experience working with [a particular researcher] that was not a learning experience. A good growth experience.”

## Discussion

Our investigation was unique in at least four ways. First, the present study represents one of the very few studies wherein the relationship between the research experience of the lead author and the type of collaboration has been compared. Second, the current work appears to represent the first wherein this relationship has been examined as a function of both gender and research methodology. Third, this study represents one of the only inquiries to combine bibliometric techniques and a qualitative research approach, yielding what Onwuegbuzie et al. (2018) called a mixed methods bibliometric study. Fourth, because *JMMR* is a multidisciplinary journal and the participants selected for the qualitative phase represented various disciplines (e.g., education, psychology, health), both phases of this mixed methods bibliometric study were multidisciplinary in nature.

**Validating/legitimizing the findings.** We used the meta-framework of Benge, Onwuegbuzie, and Robbins (2012) to assess threats to legitimation pertaining to the quantitative findings, qualitative findings, and mixed methods research findings. This meta-framework incorporates frameworks that have been conceptualized to assess threats to the internal and external validity of the findings pertaining to the quantitative phase (e.g., Campbell, 1957; Onwuegbuzie, 2003), threats to the internal credibility and external credibility of the results relating to the quantitative phase (e.g., Maxwell, 1992; Onwuegbuzie & Leech, 2007), and threats to the legitimation of the findings stemming from the mixed methods phase (Onwuegbuzie & Johnson, 2006).

**Validity of findings from quantitative phase.** With respect to the internal validity of the quantitative findings, our overall sample size of 223 articles indicates that we had more than sufficient statistical power to conduct our inferential analyses (i.e., one-way ANOVA, Mann-Whitney *U* tests). Thus, our overall sample size did not pose a serious threat to the internal validity of the findings. In addition, our high inter-rater reliability (i.e., inter-coder agreement) of 100% helped to eliminate instrumentation as a threat to internal validity.

With regard to external validity, the fact that *JMMR* represents the only journal devoted exclusively to mixed methods research articles and that every peer-reviewed article was examined that had been published in *JMMR* at the time of the study suggests that our quantitative (i.e., bibliometric) findings might be generalizable (i.e., have adequate external validity). However, replications of this study are needed examining mixed methods research articles published in other journals.

**Legitimation of findings from qualitative phase.** With respect to internal credibility, the biggest threats to the findings were descriptive validity (i.e., the factual accuracy of the account; Maxwell, 1992) and interpretive validity (i.e., the extent to which our interpretations of these accounts provide an understanding of the mixed methods researchers' collaboration experiences and the meanings that they attach to their words and experiences; Maxwell, 1992). Descriptive validity was enhanced by the fact that all participants member-checked the transcripts for accuracy, adequacy, and authenticity (Lincoln & Guba, 1985; Manning, 1997). Interpretive validity was enhanced by the participant-researchers reading the interpretations and verifying the emergent themes, as well as via the debriefing interviews that were conducted on those who interviewed the research participants (Onwuegbuzie et al., 2008).

With respect to external credibility, the sample size of 14 used in the qualitative phase far exceeded Guest et al.'s (2006) sample recommendation for achieving data saturation utilizing a relatively homogeneous sample (i.e., mixed researchers). This sample size, coupled with the fact that little additional information was provided by the participants at the member-checking phase, suggests that data saturation very likely took place.

**Legitimation of findings from the mixed research phase.** Onwuegbuzie and Johnson (2006) identified nine legitimation types that are relevant to mixed research. Each of these legitimation types is defined in Table 4, together with an explanation of how they were addressed in our investigation. This table indicates that all nine threats were addressed to some degree. Notwithstanding, despite the extremely rigorous nature of the mixed methods research design, replications of this mixed methods bibliometric study are needed to assess the reliability, trustworthiness, and transferability of these findings.

Table 4. *Typology of Mixed Methods Legitimation Types*

Legitimation Type	Description	How Legitimation Type was Enhanced
Sample Integration	The extent to which the relationship between the quantitative and qualitative sampling designs yields quality meta-inferences.	Using a nested sampling design in which the vast majority (i.e., 80.0%) of the participants selected for the qualitative research phase had authored/co-authored one or more articles that were published in <i>JMMR</i>
Inside-Outside	The extent to which the researcher accurately presents and appropriately utilizes the insider's view and the observer's views for purposes such as description and explanation.	Capturing the participants' quantitative and qualitative data (i.e., emic [i.e., insider's] perspective) and including two participants on the research team (i.e., emtic [i.e., insider's and outsider's] perspective; Onwuegbuzie, 2012)
Weakness Minimization	The extent to which the weakness from one approach is compensated by the strengths from the other approach.	Combining empirical precision (i.e., obtained from quantitative analyses) with descriptive precision (i.e., obtained from qualitative analyses)
Sequential	The extent to which one has minimized the potential problem wherein the meta-inferences could be affected by reversing the sequence of the quantitative and qualitative phases.	Collecting quantitative and qualitative data simultaneously (i.e., concurrently)
Conversion	The extent to which the quantizing or qualizing yields quality meta-inferences.	Obtaining verification of quantitative analyses of themes via member checking and debriefing
Paradigmatic Mixing	The extent to which the researcher's epistemological, ontological, axiological, methodological, and rhetorical beliefs that underlie the quantitative and qualitative approaches are successfully (a)	Adopting a critical dialectical stance (Onwuegbuzie & Frels, 2013) that represents a meta-paradigm wherein multiple epistemological perspectives are incorporated within the same inquiry (Johnson, 2011, 2012, 2017)

Legitimation Type	Description	How Legitimation Type was Enhanced
	combined or (b) blended into a usable package.	
Commensurability	The extent to which the meta-inferences made reflect a mixed worldview based on the cognitive process of Gestalt switching and integration.	By using a team of researchers that was diverse with respect to research training, research experience, and discipline (e.g., higher education, literacy, library science, research methodologist)
Multiple Validities	The extent to which addressing legitimation of the quantitative and qualitative components of the study result from the use of quantitative, qualitative, <i>and</i> mixed validity types, yielding high-quality meta-inferences.	Using techniques (e.g., intercoder agreement, member checking, debriefing) that addressed as many threats to the legitimation of both the qualitative and quantitative findings as possible
Political	The extent to which the consumers of mixed methods research value the meta-inferences stemming from <i>both</i> the quantitative and qualitative components of a study.	Using rigorous qualitative and quantitative research techniques

*Note.* This table was adapted from Onwuegbuzie and Johnson (2006). Reprinted with kind permission of the Mid-South Educational Research Association and the Editors of *Research in the Schools*.

**Interpretation of the findings.** Numerous findings emerged from the quantitative research phase of our mixed methods bibliometric study. First and foremost, a significant proportion of mixed methods research articles involve multiple authors, involving as many as 13 authors. This finding suggests that the field of mixed methods research is characterized by collaboration. Interestingly, nearly one half (i.e., 42.2%) of the articles involved either two or three authors.

The finding that the research experience of the lead author ranged from 0 to 49 years and that approximately 25% of lead authors have been conducting research for more than 20 years indicates that a significant proportion of researchers serving as leaders within the mixed methods research field are experienced researchers. This is very encouraging because it suggests that the mixed methods research field is being guided by experienced researchers and methodologists. Indeed, that researchers with as many as 49 years of research experience are still leading mixed methods research articles is very inspiring! However, also encouraging are the findings that exactly one half (50.0%) of the lead authors have research experience of 10 years or less, and approximately one fourth of the lead authors (i.e., 24.8%) have research experience of 5 years or less, because they indicate that what Onwuegbuzie (2016) refers to as the *mixed methods research pipeline* is healthy. That is, based on the presenting findings, the supply of (potential) mixed methods research leaders in the pipeline is extremely encouraging.

Another interesting observation was the quadratic and quintic trends in research experience for lead authors of single-authored articles and multiple-authored articles, respectively. Further, the average research experience of lead authors as a whole has decreased

from 20.29 in 2007 (its inception) to 14.24 in 2017 (the last complete year)—a significant reduction of 29.8%! One possible explanation for this reduction in research experience might reflect the increased access to mixed methods research courses (e.g., in graduate-level programs worldwide); workshops (e.g., at professional conferences); authored and edited books on mixed methods research; handbooks on mixed methods research; mixed methods research articles that have been published in an array of other journals representing the social, behavioral, and health sciences; dissertations that represent mixed methods research; special issues on mixed methods research that have been published in various journals; conferences worldwide devoted to mixed methods research; special interest groups of various professional research associations; websites devoted to mixed methods research; and an increasing number of funded mixed methods research projects (for a detailed account of these items, see, for e.g., Onwuegbuzie, 2012). This increased access, in turn, might mean that researchers are being competent in mixed methods research at increasingly earlier stages in their academic careers, thereby making them confident to lead research projects at significantly earlier stages of their scholarly journeys. However, qualitative research inquiries are needed to investigate this potential link between increased access to the mixed methods research knowledge base and leadership within the mixed methods research field.

No statistically significant difference emerged in research experience between lead authors who represented single authors and those who had one or more co-authors. Nor did a statistically significant difference emerge as a function of gender of the lead author or article genre. Thus, mixed methods research teams appear to comprise a similar proportion of lead researchers/authors with *more* research experience and researchers/authors with *less* research experience. That is, more-experienced researchers are not any more or less likely to lead research projects than are their less-experienced counterparts. It will be interesting to determine whether, in the upcoming years, any continued increase in the number of less-experienced lead authors will be associated with a greater or smaller propensity for collaboration.

Analysis of the qualitative data stemming from the three participants with the most research experience and the three participants with the least research experience revealed three themes and nine subthemes that identified several differences and similarities between the desire for collaboration and their research experiences. Although the quantitative findings revealed that these two subgroups have very similar propensity for collaboration, the qualitative findings suggest that for the least-experienced mixed methods researchers, collaboration might be associated with negative emotions (e.g., frustration, stress, and anxiety) and that they experience the most difficulty, perceived weaknesses, and lack of confidence when collaborating with other researchers—regardless of the research experience of their co-researchers/co-authors. The reported negative emotions and experiences by the least-experienced sub-participants coupled with the lack of perceived weaknesses reported by the most-experienced sub-participants suggest that years of experience have an impact on their affective state during the conduct of collaborative mixed methods research studies.

Future qualitative investigations should investigate the transferability of these findings, as well as how these negative emotions and experiences manifest themselves during the course of the mixed methods research project. If these findings turn out to be transferable to other less-experienced mixed methods researchers, then interventions such as providing students with opportunities to lead mixed methods research teams before they graduate—as has been the case in this current study—should be studied.

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